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### (28) Right Dates

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*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

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**(54) Title:** RIBBED MODULE, SECURITY SIGN AND SECURITY BARRIER SUBMERGENCE SYSTEM

**(57) Abstract:** A ribbed module, security sign and security barrier submergence system to buoy and submerge structures for use with a module having a buoyant structure so that a single module or a plurality of modules nested together can be ballasted to a particular depth in any body of water, regardless of the temperature, salinity or other physical/chemical composition of the water.

PATENTSIN THE UNITED STATES PATENT AND TRADEMARK OFFICE

5 TITLE: RIBBED MODULE, SECURITY SIGN AND  
SECURITY BARRIER SUBMERGENCE SYSTEM

INVENTOR: DENNIS SMITH

SPECIFICATION

10 Cross Reference to Related Applications

This application claims the benefit of U.S. Provisional Application No. 60/252,803 filed November 22, 2000.

15 The ribbed module, security sign and security barrier submergence system of the present invention relates to apparatus and methods to buoy and submerge structures for use in different bodies of water.

20 The disclosures of U.S. Patent Nos. 5,879,105 and DES. 403,780, and application Serial No. 60/249,853 filed November 17, 2000 are incorporated herein by reference. The named U.S. patents are assigned to Wave Dispersion Technologies, Inc. (WDT), and recorded at Reel 010968, Frame 0101. The inventor for the present application is the President of WDT.

OBJECTS AND SUMMARY OF THE INVENTION

25 It is an object of the present invention to provide a submergence system for use with a module having a buoyant structure so that a single module or a plurality of modules nested together can be ballasted to a particular depth in any body of water.

5 It is an object of the present invention to provide a  
submergence system for modules, security signs and security  
barriers consisting of the plurality of these modules, which  
system is easily employed in any body of water regardless of  
the temperature, salinity or other physical/chemical  
10 composition of the water.

BRIEF DESCRIPTION OF THE DRAWINGS

15 For a more complete understanding of the present  
invention, reference may be had to the following description of  
exemplary embodiments of the present invention considered in  
connection with the accompanying drawings, of which:

20 FIG. 1 is a top perspective view of a ribbed module having  
a submergence system according to the present invention;

FIG. 2 is a bottom perspective view thereof;

25 FIG. 3 is a top perspective view of a plurality of ribbed  
modules arranged for a security sign, security barrier, or  
marine wildlife refuge having the submergence system according  
to the present invention;

30 FIGS. 4 and 5 are views of the ribbed module and a flow of  
fluid for the submergence system of the present invention; and

35 FIG. 6 is a view of mounting features for the ribbed  
module having the submergence system according to the present  
invention.

Fig. 7 is a view of an assembly of buoyant modules having  
an anchor and topped by rolled barbed wire.

5       Fig. 8 is a view of an assembly of buoyant modules similar  
to Fig. 7, topped by strung barbed wire and having mounting  
posts for signage.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

10      Referring to FIGS. 1-6, a ribbed module with a submergence  
system according to the present invention is shown generally at  
10. The module is part of the Whisprwave® system owned by Wave  
Dispersion Technology, Inc.

15      The module 10 is formed from two halves 12, 14 joined  
together as in FIG. 6. Each half includes at the top portion  
an inlet nozzle 16, 18 and a brass fitted compressed gas inlet  
nipple 20, 22 with a plastic protective sheath. At an  
opposite side of the module 10, for each corresponding half 12,  
14, there is a one way valve fitting 24, 26. The operation of  
the submerging system is designed to prevent having to  
20     disconnect the module 10 or dispersion system 100 (FIG. 3)  
during the winter because the module must be submerged below  
the freezing level or be removed from the water. Removing the  
module from the water is time-consuming and expensive. The  
alternative would be to "bubble" the system 100. The module/  
25     system may also be submerged when the location that the  
module/system is to be used in must be used for surface  
activities or emergency boat traffic.

30      The present invention is a submerging system for the  
Whisprwave® in cold climates where it is going to be subjected  
to ice. In operation, when it is required to remove the system  
from the water's surface, the module 10 is filled with fluid,  
such as water, through the inlets 16, 18 at the top of the  
module as shown by arrows 28.

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The one-way valve fittings 24, 26 at the bottom of the module prevent water from escaping the module halves 12, 14. Hoses (not shown) can be connected to the fittings 16, 18 to fill the module with water.

10 A manifold (not shown) can be connected to a plurality of the modules 10 to fill the modules concurrently. The modules are filled with the water in which they are positioned or anchored. The Whisprwave® is then weighted down using for example a sandbag. Alternatively, a sinker is disposed on the anchor chain for the module 10, 100 so that when the Whisprwave® is filled with water, it will sink and that sinker will be adjusted to the desired depth. After the modules are filled with water, caps 30, 32 are threaded onto the inlets 16, 18 to seal off the module.

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20 The Whisprwave® will remain flooded and anchored beneath the ice layer during the winter, causing no harm to surface "traffic". There is no necessity to disconnect the Whisprwave® and remove it shoreside until spring. In the spring, before the algae blooms, and before boats are put into the body of water, the compressed gas inlets 20, 22 are connected to the pressure lines 34, 36, as shown in FIG. 5 and the module pressurized by introducing compressed air into the module 10. The fluid in the module is blown out through the one-way valves 24, 26.

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The one-way valves 24, 26 are adjusted for a pressure to purge the fluid, but not blow apart or deform the module by over pressurizing with compressed air.

5        As soon as the pressurized gas flow is stopped, the one-way valves 24, 26 seat, and the module floats to the surface.

10      Only the ballast necessary to float the module is removed, so that the module floats to the surface. At the surface, the remaining ballast is pumped from the module.

15      Each one of the halves 12, 14 includes a fluid chamber in communication with the corresponding one of the fluid inlets, 16, 22, compressed gas inlets 20, 22, and one-way valves 24, 26. Ballast purged from the module by the compressed gas exits the one-way valves 24, 26 as indicated by the arrows 38 in FIG. 5.

20      Each one of the halves, 12, 14, as shown, is provided with its own separate discrete sidewall i.e. this preferred embodiment 10 does not share a sidewall between the halves. Therefore, each one of the halves, 12, 14 includes its own submergence system of the necessary inlet valve, one way outlet valve, and gas inlet so that, if required, only one half of a module needs to be ballasted.

25      FIG. 6 shows the mechanical fastening features of one of the ribbed modules 10 according to the present invention. As shown in FIG. 6, each one of the halves, 12, 14 is provided with keyway 40 and a keyway 42. The halves 12, 14 are joined together by seating the key in the keyway and twisting the halves so that the halves 12, 14 lock into position.

30      An alternate embodiment is formed as a single module having one chamber therein for controlling the ballast and buoyancy of the module which operates in a similar fashion.

5       Figs. 7 and 8 show embodiments of the submergence system in schematic form. They have multiple layers of modules, the height of which can be adjusted by the buoyancy in the lower layers. The anchoring means 198 hangs from the lower layer of  
10      modules. Fig. 7 shows barbed wire rolls on top of the uppermost modules to act as a barrier. Fig. 8 shows strung barbed wire hung on mounting posts or fence posts 192, which can also be used to support a sign, 190.

15      It will be understood that the embodiments described herein are merely exemplary and that a person skilled in the art may make many variations and modifications without departing from the spirit and scope of the invention. All such modifications and variations are intended to be included within the scope of the invention as described herein.

5       What is claimed is:

1. A submergence system comprising:

a plurality of like buoyant modules spaced along one horizontally disposed line;

10      each said module including front and back walls, top and bottom walls, spaced opposite side walls extending outwardly beyond the widths of the other said walls and a plurality of intersecting surfaces between said walls;

15      each said module including a plurality of outwardly extending yokes connected to and spaced about said walls, said yokes including passages for enabling attachment to adjacent spaced modules in said line;

a plurality of cables passing through respective yoke passages for securing said modules along said line;

20      anchor means connected to said line of modules for holding said line in a relatively fixed position;

25      at least one of said like buoyant modules comprising at least one fluid inlet and at least one gas inlet on said module,

at least one one-way outlet valve in the vicinity of said bottom wall of said module to purge said fluid but not deform said module,

5 at least one cap removably fixed to said inlet nozzle to seal off said module,

a hose removably connectable to said inlet nozzle to fill said module with fluid to submerge said assembly, and

10 a pressurized gas line removably connectable to said gas inlet nipple to introduce compressed air into said module to float said assembly.

15 2. The assembly of claim 1 including a plurality of like buoyant modules spaced along a second horizontally disposed line positioned below and interleaved with said one line, said plurality of cables passing through respective yoke passages in each said horizontal line of modules and connecting said lines together.

20 3. The assembly of claim 1 including a plurality of like buoyant modules spaced along a pair of parallel horizontally disposed lines positioned below and interleaved with said one line, said plurality of cables passing through respective yoke passages in each said horizontal line of modules and connecting said lines together.

25 4. The assembly of claim 1 wherein said anchor means is connected to a cable passing through yoke passages.

5. The assembly of claim 1 wherein said modules include ribbed outer surfaces.

5       6. The assembly of claim 2 including a display device mounted on an upper wall of said one line of modules.

10      7. The assembly of claim 3 including a plurality of like buoyant modules spaced along a fourth horizontally disposed line positioned below and interleaved with said pair of parallel horizontally disposed lines, said one and fourth lines being spaced and aligned vertically, said plurality of cables passing through respective yoke passages in each said horizontal line of modules and connecting said lines together.

15      8. The assembly of claim 4 including a barbed wire fence mounted on an upper wall of said one line of modules.

20      9. The assembly of claim 4 wherein each module includes four yokes positioned at upper and lower corners thereof, the lower corners of said modules in said one line being connected to respective upper corners of said pair of lines below and interleaved with said one line, the upper corners of said modules in said fourth line being connected to respective lower corners of said pair of lines.

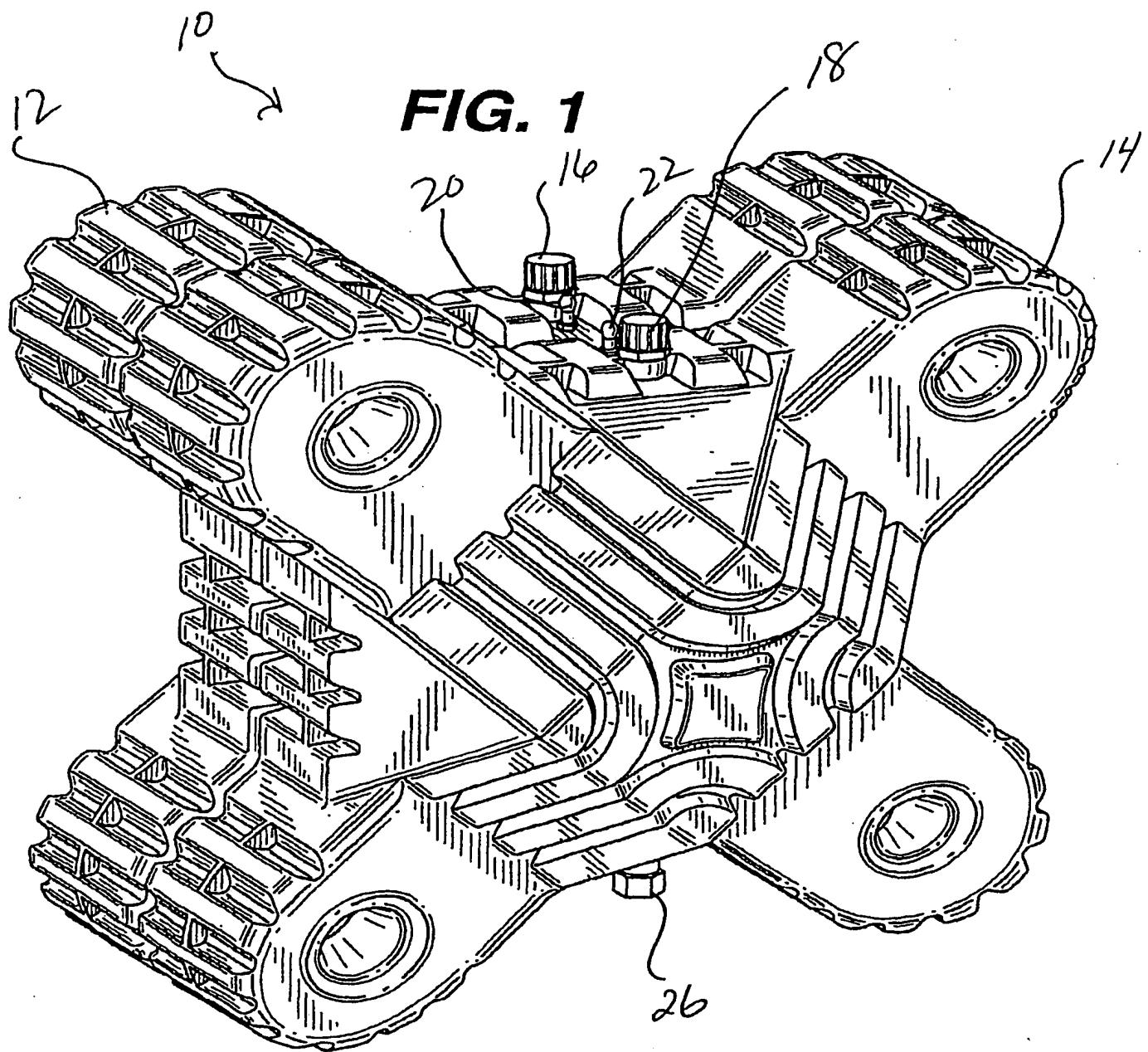
10. A buoyant module for use in a submergence barrier system comprising:

25      front and back walls, top and bottom walls, spaced opposite side walls extending outwardly beyond the widths of the other said walls and a plurality of intersecting surfaces between said walls;

30      each said module including a plurality of outwardly extending yokes connected to and spaced about said walls,

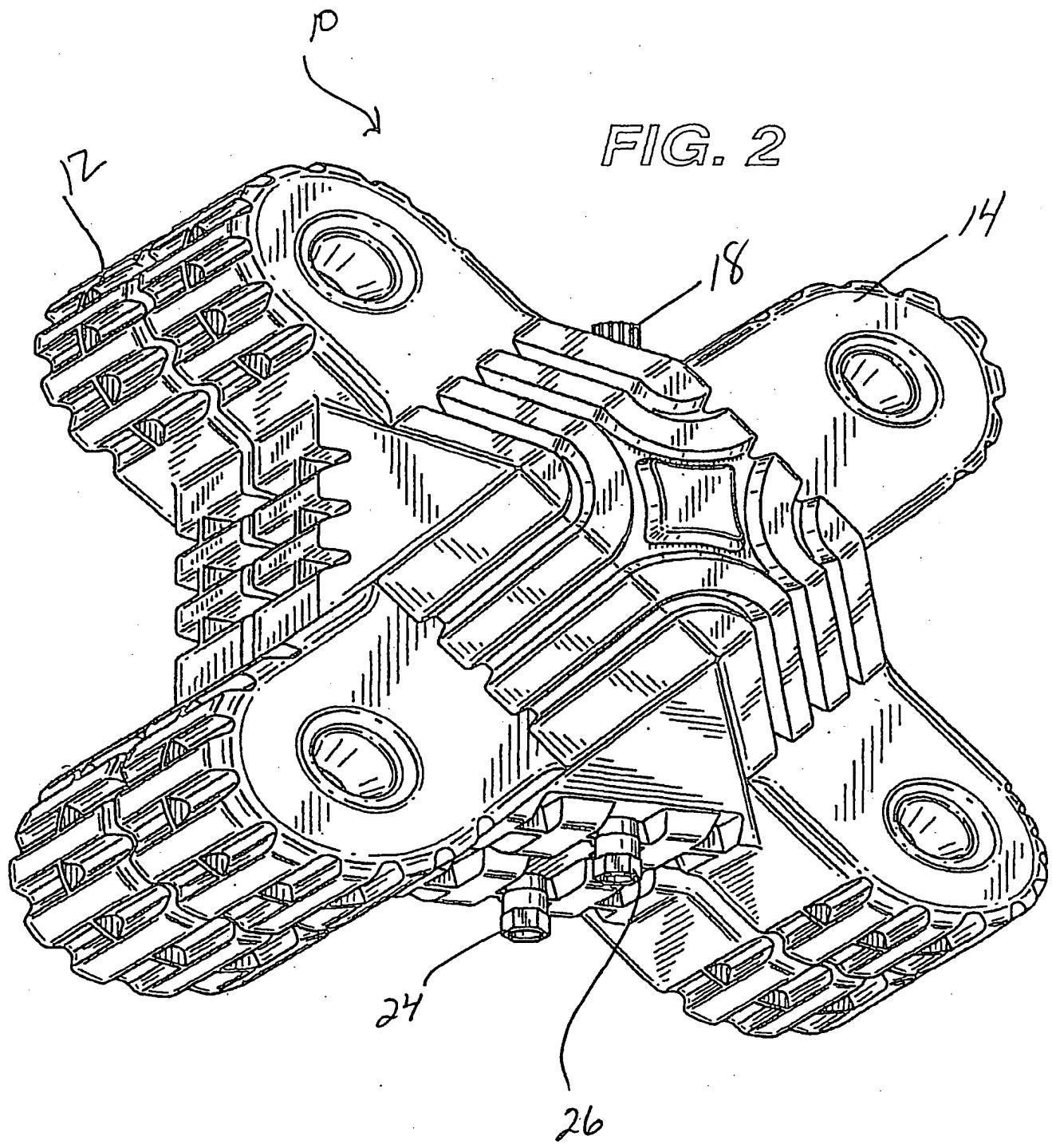
- 5        said yokes including passages for enabling attachment to adjacent spaced modules in said line;
- at least one fluid inlet and at least one gas inlet on said module,
- 10      at least one one-way outlet valve in the vicinity of said bottom wall of said module to purge said fluid but not deform said module, and
- 15      at least one cap removably fixed to said inlet nozzle to seal off said module.
11. The module of claim 10 wherein said module includes ribbed outer surfaces.
12. The module of claim 10 further comprising two separate sealable su-modules connected to form a unitary module.
- 20     13. The module of claim 12 wherein at least one of said sub-modules includes a fluid and gas inlet and a fluid outlet.

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**FIG. 1**

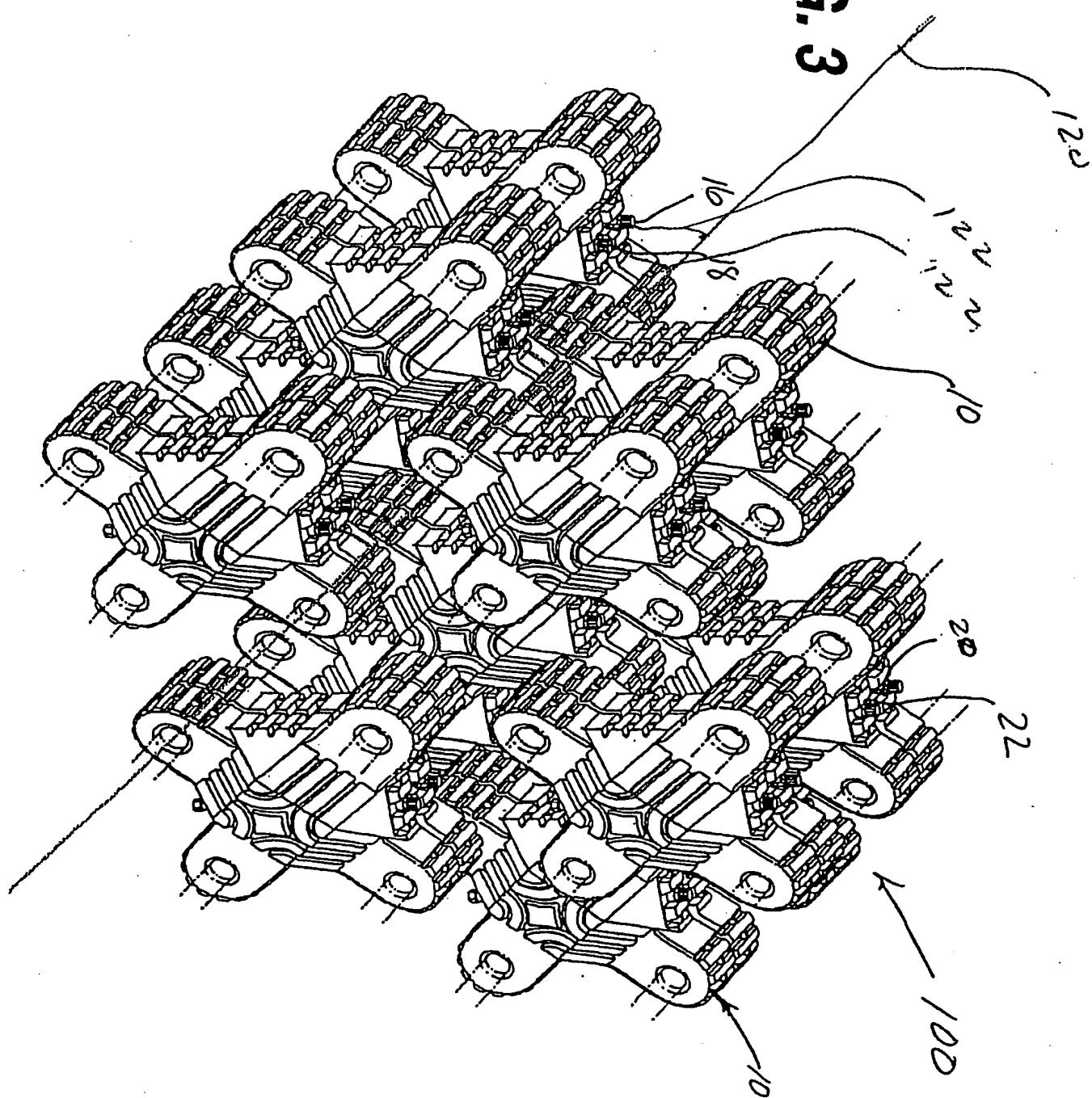
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FIG. 2

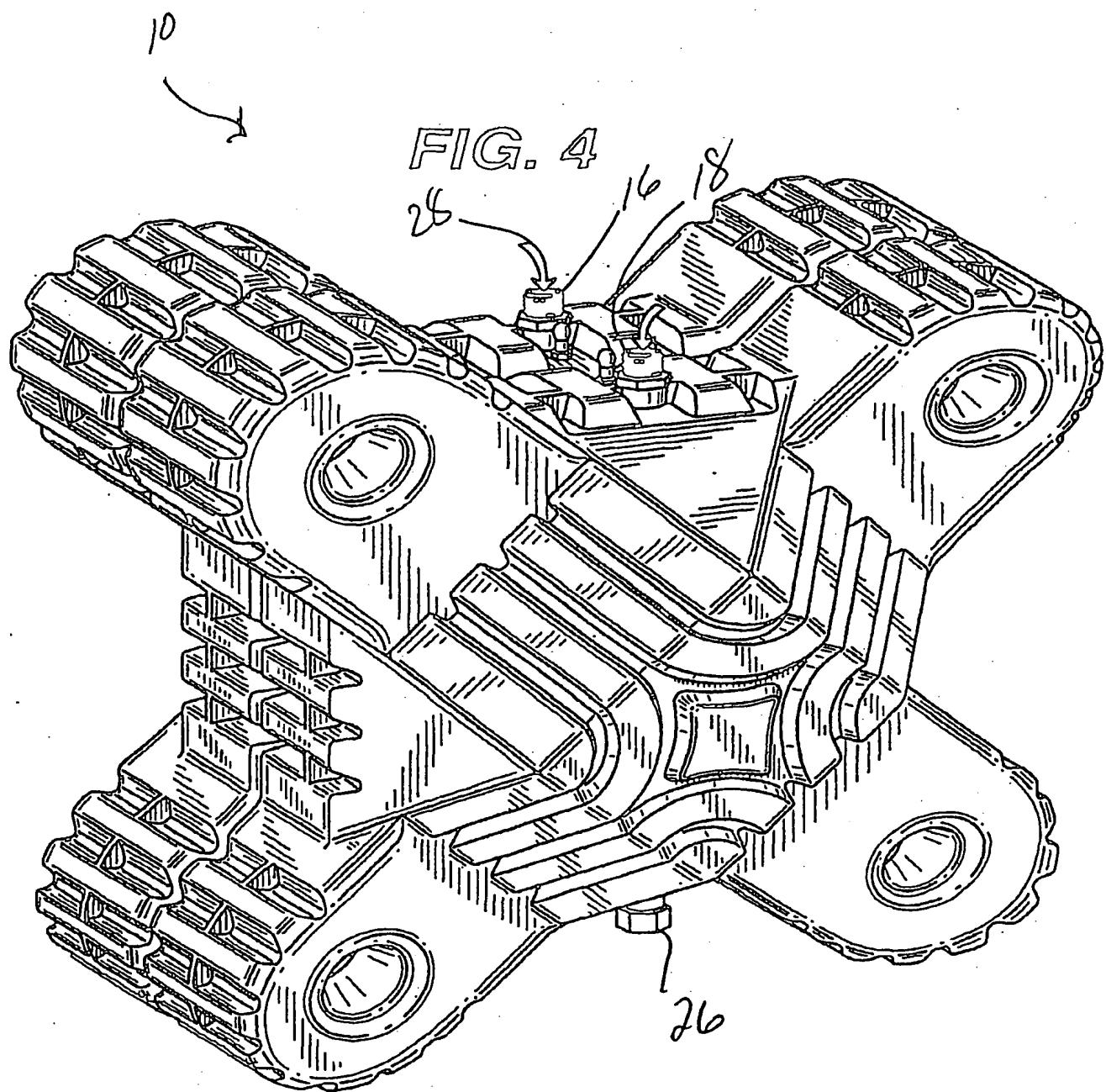


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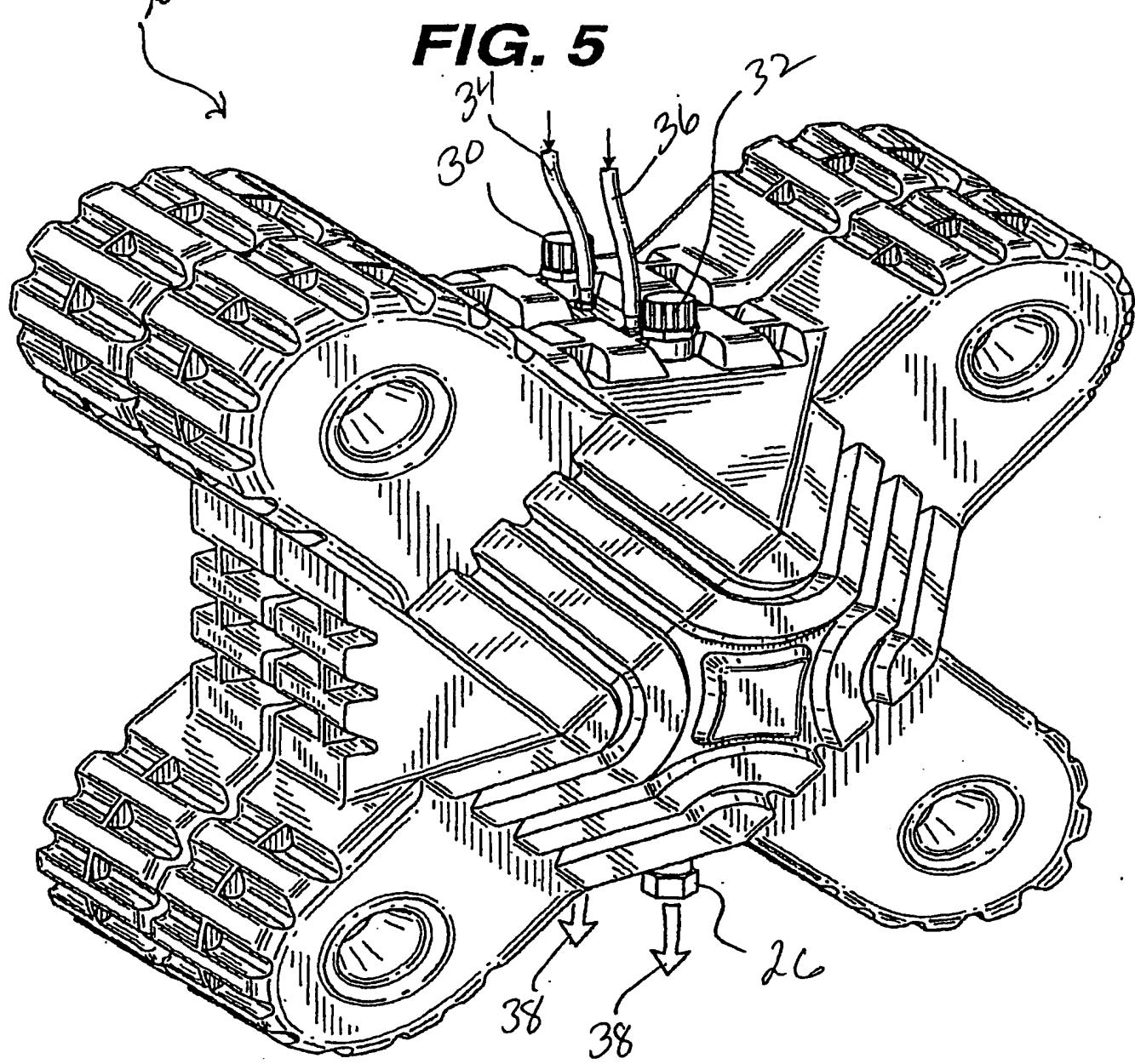
FIG. 3



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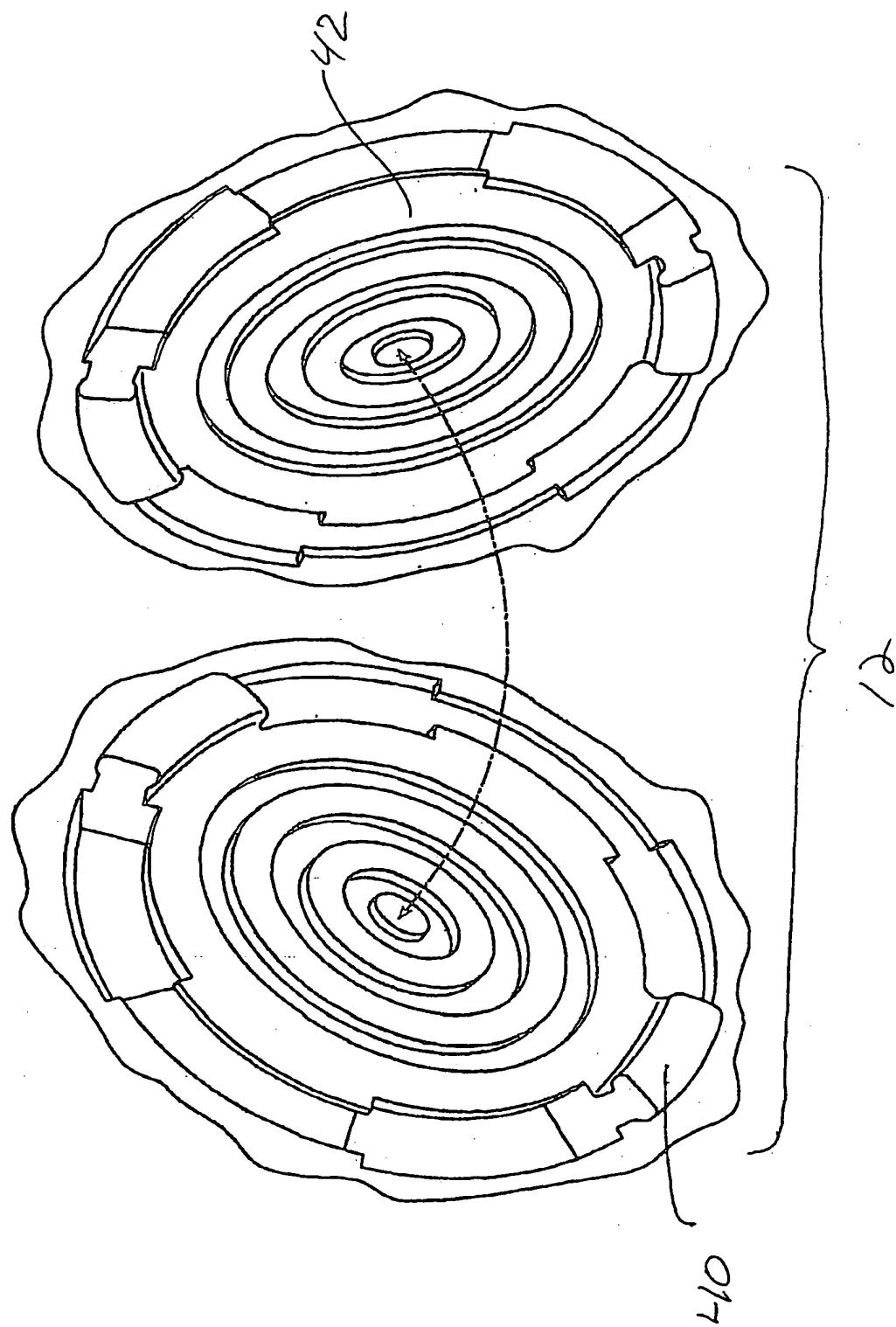


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**FIG. 5**

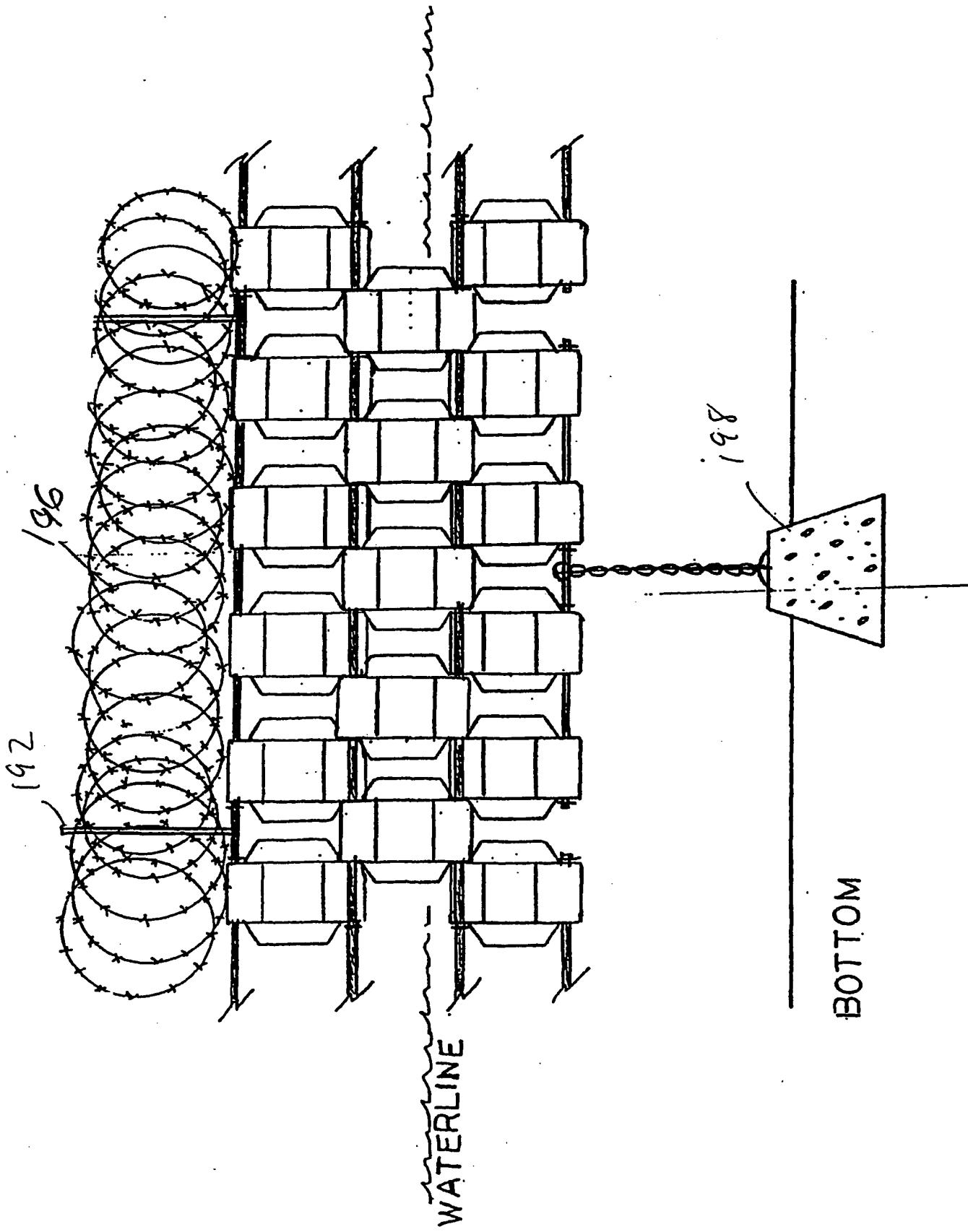
6/8

FIG. 6



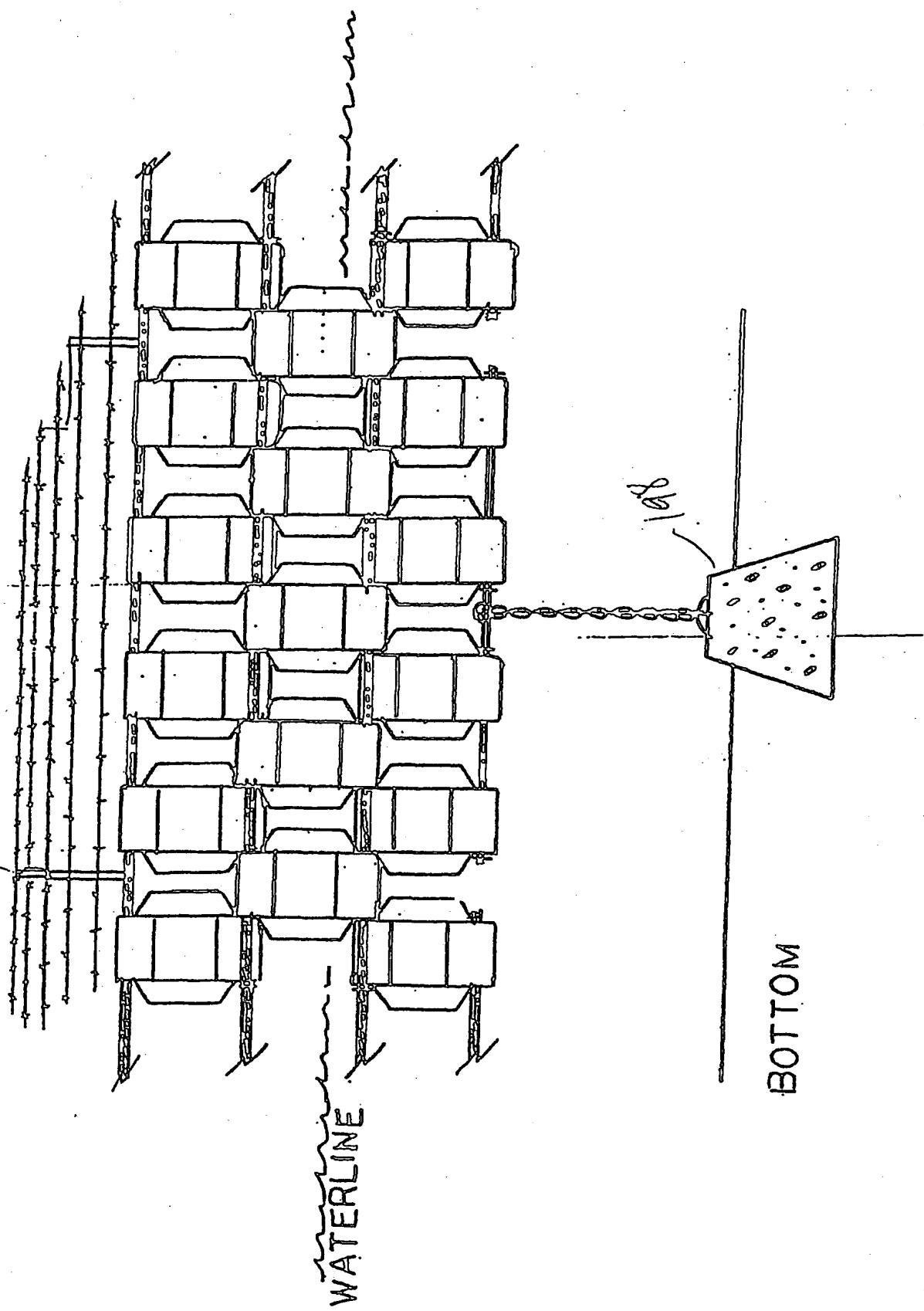
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FRONT VIEW FIG 7



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FRONT VIEW FIG. 8  
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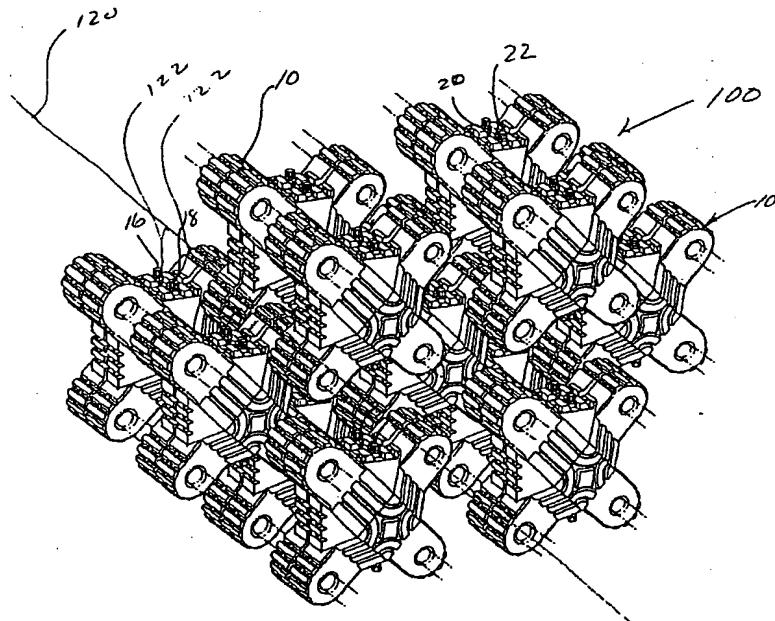
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(72) Inventor: SMITH, Dennis, G. [US/US]; 573 Springfield Avenue, Summit, NJ 07901 (US).

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(54) Title: RIBBED MODULE, SECURITY SIGN AND SECURITY BARRIER SUBMERGENCE SYSTEM



**WO 02/042047 A3**

(57) Abstract: A ribbed module (10), security sign and security barrier (192) submergence system (100) to buoy and submerge structures for use with a module (10) having a buoyant structure so that a single module or a plurality of modules nested together can be ballasted (198) to a particular depth in any body of water, regardless of the temperature, salinity or other physical/chemical composition of the water.

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## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US01/44751

### A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : E02B 3/04  
US CL : 405/29, 26

According to International Patent Classification (IPC) or to both national classification and IPC

### B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 405/21, 23, 25, 26, 27, 29, 30, 31, 33, 35, 110, 111, 114, 116

Documentation searched other than minimum documentation to the extent that such documents are included in the fields ~~searched~~

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

NONE

### C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 3,864,920 A (TAZAKI et al.) 11 February 1975, Figs. 4 and 13.	1-13
Y	US 4,869,617 A (CHIODO) 26 September 1989, Figs. 1 and 5.	1-13
Y	US 5,879,105 A (BISHOP et al.) 09 March 1999, Figs. 1, 2, 12, and 14.	1-13

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance		
"E" earlier document published on or after the international filing date	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"O" document referring to an oral disclosure, use, exhibition or other means	"g."	document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search

29 OCTOBER 2002

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